

Mystery Numbers: Number Sense

Strand: Number and Number Sense

Topic: Reading, writing, and comparing whole numbers

Primary SOL: 4.1 The student will

- a) read, write, and identify the place value of each digit in a nine-digit whole number; and
- b) compare and order whole numbers expressed through millions.

Materials

- Student dry-erase boards or Periods Place-value Chart (attached)
- Mystery Numbers for Comparing and Ordering activity sheet (attached)
- Envelope or small brown paper bag (one for teacher and one for each small group)

Vocabulary

compare, digit, equal to (=), greater than (>), hundreds, hundred millions, hundred thousands, less than (<), not equal to (\neq), one millions, ones, order, period, place value, standard form, tens, ten thousands, ten millions, thousands, written form

Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Write the number 134,276,983 on the board. Ask for a volunteer to read this number aloud. Remind the students that there is a particular way in which we read numbers and that we should not use the word “and” when reading a whole number. Ask the students to help you write the number in words. Next, ask the students questions about this number, such as: “Which digit is in the hundred-thousand place?” or “What is the value of the digit 9?” Continue to describe this number by asking the students whether they can tell you a number that is greater than or less than this number. Have the students think about which benchmark the number is closest to by asking whether this number is closer to 100,000,000 or 200,000,000 and to explain their reasoning.
2. Tell the students that they are going to practice reading and writing mystery numbers pulled from a bag. Using the Mystery Numbers for Comparing and Ordering activity sheet, cut out the numbers and place them in a bag before the lesson. These numbers are written in either standard form or written form and vary from nine-digit whole numbers to six-digit whole numbers.
3. First, model the activity by randomly selecting a number from the bag and reading the number orally to the class. Students should write the number in standard form on their dry-erase boards or on their Periods Place-value Chart. For example, the teacher may select the number 1,045,934, reading the number as one million, forty-five thousand, nine hundred thirty-four.
4. Circulate around the room to monitor the progress of students, making sure the students are correctly writing the number in standard form. Once the students have

correctly written the number, ask the students additional questions to strengthen their understanding of place value. Some questions could include:

- What digit is in the ten-thousands place? (Or, circle the digit in the ten-thousand place.)
 - What is the value of the digit 4?
 - When adding 1,000 to this number, what will be the new number become? What happened to the original number? Why did the digit in the thousands place value change and the other place values remain the same? Will this always happen?
 - What if I added 6,000 to the original number? Which place value changed and which ones remained the same? Why?
5. Once students are familiar with the activity, have a student volunteer to come up and pull a mystery number from the bag. Have the student correctly read this number to his/her classmates as the rest of the class writes the number on their dry-erase boards or on their place-value charts. Students should either write the number in standard form or written form as directed by the teacher. It is important to continue to walk around or have the students show their number written in standard form or written form. Continue to ask additional questions like those shown above.
 6. Next, have the students break up into small groups of three or four. Direct students to take turns selecting mystery numbers from the bag. One person draws a number and tells the other students in the group to write the number in either standard form or written form to match the form of the number drawn. Ask the writers to compare what they wrote, and if they do not agree, compare responses to the number pulled from the bag. The students continue to take turns reading the mystery numbers while the other students write the number in standard form or written form.
 7. Walk around the room, posing questions to check for student understanding and making notes of any student misconceptions and who may need additional support.
 8. Transition the class to thinking about how place value is used to compare numbers. First, remove all numbers greater than the millions from the bags. Bring the students back together as a class to discuss strategies for comparing two whole numbers.
 9. Have two students volunteer to each pull a mystery number from the teacher's bag and read them correctly to the class. Ask the class to write the numbers in standard form next to each other on their dry-erase boards or on a sheet of paper and use the symbols $<$, $>$, and $=$ to compare. Students hold up their boards while the teacher looks around and uses the responses to clarify the appropriate uses of $=$, $>$, and $<$. Pose questions, such as, *"Why are both $2,453 > 2,443$ and $2,443 < 2,453$ true statements?" "How did you decide which number was larger?" "When would you be able to write a sentence using the equal symbol?" "When would you be able to write a sentence using not-equal symbol?"* Then have the students break up into their small groups to practice comparing two whole numbers. In their small groups, have the students take turns selecting two numbers, while the others correctly write the numbers in standard form and use the appropriate symbol to compare. Writers compare their sentences and resolve why some sentences may be written differently.

10. Last, the class will progress from using place value and strategies for comparing numbers through a million to ordering numbers through the millions. Have four students volunteer to pull out a number from the bag then read and write their number on the board in no particular order. Next, have the class correctly order and rewrite the numbers from least to greatest or greatest to least on their dry-erase boards or a sheet of paper. Use the students' responses to pose questions that allow students to explain their strategies for ordering numbers.

Once the students understand, have the students work together in groups of four. Each person in the group pulls a number from the mystery bag and places the number face up in the middle of the table for all to see. As a group, work together to put the numbers in the order agreed upon by the group, and when everyone is satisfied, record the list on their individual papers. Circulates to pose questions, note understandings and misconceptions, and who may need additional support.

Assessment

- **Questions**
 - Does the use of zeroes in a number always affect the value of the number? Why or why not? What is the importance of zeroes?
 - What pattern do you see in the place-value system?
 - What is the best strategy to use when comparing two whole numbers with different numbers of digits?
 - What is the purpose of using commas when writing numbers with more than three digits?
 - Where would you see large numbers written or used in everyday living? (e.g., population, purchasing a house)
- **Journal/writing prompts**
 - The students were asked to compare the following numbers: 94,789 and 459,051. Student A said 94,789 is greater because the digit 9 is more than the digit 4. Student B said that 459,051 was greater because 400,000 is greater than 90,000. Which student was correct? Explain your answer.
 - How would you explain to a new student how to compare the numbers 5,934,982 and 5,932,993? Which number is greater? Why?
- **Other Assessments**
 - Give students two numbers to compare, and have them explain which one is greater and why.
 - Using only the digits 1-7, what is the largest number you can create with the digit 6 in the tens place?
_____, _____, _____, _____, _____
 - Give students four numbers through the millions and ask students to order from least to greatest and explain how they make their decisions.

Extensions and Connections (for all students)

- Vanishing digits is an activity that focuses on expanded form and the value of digits. Start with a number such as 3,567,893. When creating these numbers, it is important not to use the same digits twice. Students may use a calculator or solve mentally. Next tell the students that you would like the digit 6 to vanish and become zero. Using the calculator, what can you subtract so that the digit 6 disappears? Since the value of the digit 6 is 60,000, when you subtract this amount from 3,567,893 the new number becomes 3,507,893. Continue to make digits vanish until the students reach the number zero.
- Have the students work with a partner by taking turns rolling a 10-sided dice to create a seven-digit number. The goal is to create the largest number, so students should strategically place the numbers rolled in certain locations to win. Once both students have created their number, the student with the highest number wins.

Strategies for Differentiation (for all students)

- Use grid paper to assist students in lining up vertical columns.
- Use the Periods Place-value Chart.
- Read numbers on the cards written in word form to the student or remove numbers in written form from the bag.
- Limit the number of cards in the bag.
- Include number cards in the bag that go beyond the millions when comparing and ordering.
- Post an anchor chart with the symbols and what they mean.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

Periods Place-value Chart

Millions Period			Thousands Period			Ones Period		
Hundred-Millions	Ten-Millions	Millions	Hundred-Thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones

Mystery Numbers for Comparing and Ordering

Cut numbers apart and place them in envelopes or brown paper bags.

4,508,939	347,893,801	23,478,001
178,800,001	23,901,825	123,782,000
40,673,922	405,893	1,894,893
673,902,905	97,700,892	6,000,003
572,894,572	60,008,081	783,903,091
56,983,000	3,789,091	800,007
673,903	55,893,021	873,902
one million, thirty thousand, five	Fifty-five million, three hundred thousand, thirteen	Six hundred fifty-two thousand, three hundred twenty
Eight hundred million, twenty thousand	Seven hundred twenty-two thousand, eighty-five.	Twenty-five million, three
Ninety-one million, three hundred twenty-two thousand, five hundred eighty-one	Seven million, three thousand, two hundred fifty	Fifty three million, three hundred two thousand, eight
Six hundred thirty-nine million, fifty-three	Twenty-two million, eighty hundred thousand, three hundred	Two million, four hundred eight thousand, seven hundred
Three hundred million, two	Eighty million, forty-six thousand, eight hundred nine	Seventy-two million, three hundred seventy thousand, sixty
Twenty-nine million, two hundred seven thousand, eight hundred forty-one	Seven hundred ninety-nine thousand, five hundred eight	Three hundred million, five hundred six thousand, five